

REMARKS

Claims 1-4, 6-14 and 16 are pending. The Office Action rejects Claims 1-15. Applicants amend claims 1,4 and 6; incorporate the subject matter of claims 5 and 15 into claim 1; cancel claims 5 and 15; and add new dependent claim 16 to recite that the second nitride semiconductor layer contains a region having a lower Al content at a position closer to the substrate and a higher Al content at a position farther from the substrate. Support for the amendments can be found, for example, in Fig. 4. Additionally, claim 1 has been further amended to recite that $x1>0$ with respect to the composition of the second nitride semiconductor layer. Claim 6 has been amended to conform with the amendment to claim 1. No new matter is added.

I. Rejection under 35 U.S.C. § 112, Second Paragraph

Claim 4 was rejected under 35 U.S.C. § 112, second paragraph. The Office Action asserts that it is not clear as to whether the high Al region and low Al region are located within the same island, or in separate islands within the second nitride semiconductor layer of the instant invention.

Claim 4 is amended to recite “wherein the Al content of said second nitride semiconductor layer differs from region to region of the island-like structure.” Further, claim 4 is amended to depend from claim 3 for proper antecedent basis. As discussed throughout the instant specification, the second nitride semiconductor layer is formed of an island-like structure, where the Al content of the second nitride semiconductor layer differs from region to region (see, specification, for example, at page 11, lines 29-35; and page 21, lines 16-24).

For at least the foregoing reasons, Claim 4 is not indefinite. Reconsideration and withdrawal of the rejection are earnestly solicited.

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II. Rejection under 35 U.S.C. § 102

Claims 1-4, 10-12 and 14 were rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent Appln. Pub. No. 2002/0155682 to Shibata et al. The Office Action alleges that Shibata et al discloses each feature of the rejected claims.

Applicants amend claims 1, 4 and 6; cancel claims 5 and 15; and traverse the rejection.

Claim 1 is amended to incorporate the subject matter of claim 5, i.e., the second nitride semiconductor layer composed of $\text{Al}_{x_1}\text{Ga}_{1-x_1}\text{N}$ ($0 < x_1 \leq 0.05$), to thereby obviate the rejection. Further, claim 1 is amended such that A1N constituting a first nitride semiconductor layer is restricted to A1N single crystal having a thickness of 0.005 to 0.5 μm (See page 9, lines 5-9 of the specification).

In contrast, Shibata et al nowhere discloses a combined thickness of the A1N layer as 1 μm (see paragraph [0066] of Shibata et al.) and second nitride semiconductor layer composed of $\text{Al}_{x_1}\text{Ga}_{1-x_1}\text{N}$ ($0 < x_1 \leq 0.05$).

For at least the foregoing reasons, claims 1-4, 10-12 and 14 are patentable over Shibata et al. Reconsideration and withdrawal of the rejection are earnestly solicited.

III. Rejections under 35 U.S.C. § 103

Claims 7-9 and 15 were rejected under 35 U.S.C. § 103(a) as obvious over Shibata et al.; and Claims 5, 6 and 13 were rejected under 35 U.S.C. § 103(a) as obvious over Shibata et al in view of U.S. Patent Appln. Pub. No. 2003/0016526 to Sakai et al. The Office Action alleged that it would have been obvious to modify Shibata et al to include first and/or second nitride semiconductor layers with the claimed thicknesses in order to optimize performance. Further, the Office Action alleges that the specific composition of the second nitride semiconductor layer is an art-recognized result-oriented parameter subject to routine experimentation and

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optimization, as evidenced by Sakai et al (specifically citing layer 12 in Figs. 3A and 3B of Sakai et al). Thus, it would allegedly have been obvious to incorporate the GaN nitride layer and/or laser structure of Sakai into the device of Shibata et al, so that a nitride based device with optimized performance could be obtained.

Applicants amend claims 1, 4 and 6; cancel claims 5 and 15; and traverse the rejections.

The amendment of claim 1 to incorporate therein the recitation of claim 5 obviates the rejection of claims 7-9 and 15 over Shibata et al. Applicants now address the rejection of claims 5, 6 and 13 over Shibata et al. in view of Sakai et al.

Claim 1 (as amended), includes a first nitride semiconductor layer composed of AlN single crystal having a thickness of 0.005 to 0.5 μm , and a second nitride semiconductor layer composed of $\text{Al}_{x_1}\text{Ga}_{1-x_1}\text{N}$ ($0 < x_1 \leq 0.05$). When the thickness of the first nitride semiconductor layer falls within this range, the nitride semiconductor layers (including the second nitride semiconductor layer) to be grown atop the first nitride semiconductor layer exhibit excellent crystal morphology and improved crystallinity (See specification at, for example, page 9, lines 20-24).

In contrast, Shibata et al discloses the thickness of AlN layer as being 1 μm (see paragraph [0066] of Shibata et al), *outside the scope of amended claim 1*. Moreover, in Sakai et al, the n-GaN layer 12 is formed directly on substrate 10. Thus, Sakai et al does not disclose a first nitride semiconductor layer composed of AlN single crystal as required by the present claims.

Further, the amendment to claim 1 to recite that $x_1 > 0$ with respect to the composition of the second nitride semiconductor layer clearly distinguishes over n-GaN layer 12 of Sakai which does not contain Al.

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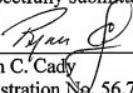
Accordingly, at least because the combination of Shibata et al. and Sakai et al would not have obtained the features of claim 1, all of claims 5-9, 13 and 15 are patentable over Shibata et al in view of Sakai et al.¹

Reconsideration and withdrawal of the rejections, and allowance of claims 1-4, 6-14 and 16 is earnestly solicited.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The U.S. Patent and Trademark Office is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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¹ To establish *prima facie* obviousness of the claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP § 2143.03